An Account of a Micrometer made of Rock Crystal. *By* G. Dollond, *F.R.S.* Read January 25, 1821. [*Phil. Trans.* 1821, *p.* 101.]

The author's object in this communication is to describe a more simple application of rock crystal to the purposes of micrometrical measurements in telescopes than any hitherto adopted. His improvement consists in the substitution of a sphere of rock crystal, in place of the usual eye-glass, by which the trouble of angular cutting is done away, it being only necessary to form the lens of a proper diameter for the focal length required.

Another advantage obtained by Mr. Dollond's micrometer is that of being able to take the angle on each side zero without reversing the eye tube; and also of taking intermediate angles, by moving the axis in which the sphere is placed; and, thirdly, it possesses the property of an eye tube not intended for micrometrical measurement, for when the axis of the crystal is parallel to that of the object glass, only one image is formed, and that perfectly distinct. After adverting to some other advantages resulting from this improvement, Mr. Dollond proceeds more particularly to describe the contrivance by reference to an annexed drawing.

The Bakerian Lecture. On the best kind of Steel and Form for a Compass Needle. *By Captain* Henry Kater, *F.R.S.* Read Feb. 1, 1821. [*Phil. Trans.* 1821, *p.* 104.]

On the return of the first expedition from the discovery of a North-west Passage, the compasses were reported to have become nearly useless, from the diminution of the directive force consequent upon the near approach to the magnetic pole. The azimuth compasses on that occasion being of the author's invention, he was anxious that the second expedition should be furnished with instruments combining the utmost power and sensibility; and was consequently led to the researches, the mode of conducting which, with their results, form the subject of this lecture.

In respect to the best material for the construction of compass needles, Captain Kater found that clock springs made of sheer steel were capable of receiving the greatest magnetic force, and that in forming the needle it should be exposed as little as possible to heat, by which its capability of receiving magnetism is diminished.

The form best adapted for the needle is the pierced rhombus, of about five inches long and two wide, and it should be tempered by previous hardening at a red heat, and then softened from the middle to about an inch from each extremity, by due exposure to heat, so as to dissipate the blue colour. The polish of the needle appears to have no effect upon its magnetism; but in the same plate of steel, of the size of a few square inches only, portions were found varying considerably in their power of receiving magnetism, though not apparently differing in other respects.

The best mode of communicating magnetism to a needle appears,

from Captain Kater's experiments, to consist in placing it in the magnetic meridian, joining the opposite poles of a pair of bar magnets, (they being in the same line,) and laying them flat upon the needle, with their poles upon its centre; then, having elevated the distant extremities of the magnets, so that they may form an angle of about 2° or 3° with the needle, they are to be drawn from the centre to its extremities, carefully preserving the same inclination; and having joined the poles of the magnets at a distance from the needle, the operation is to be repeated ten or twelve times upon each surface.

In needles from five to eight inches long, their weights being equal, Captain Kater found their directive forces nearly as the lengths; but in needles of nearly the same length and form, the directive force is as the mass, and not dependent upon the extent of surface.

Lastly, the author ascertained that the deviation of a compass needle, occasioned by the attraction of soft iron, depends, as Mr. Barlow has advanced, upon extent of surface, and is wholly independent of the mass; excepting that a thickness of the iron, amounting to about two tenths of an inch, is requisite to the complete development of the attractive energy.

Notice respecting a Volcanic Appearance in the Moon. In a Letter addressed to the President. By Captain Henry Kater, *F.R.S.* Read February 8, 1821. [*Phil. Trans.* 1821, *p.* 130.]

This volcano was first observed by Captain Kater on Sunday the 4th of February, the moon being then two days old, with a Newtonian telescope of $6\frac{1}{4}$ inches aperture, and a power of 74. The position of the volcano is shown in an annexed drawing; its appearance was that of a small nebula, subtending an angle of 3 or 4 seconds, and its brightness very variable.

It was again observed on the evenings of the 5th and 6th, but was then more faint, though occasionally exhibiting the appearance of a luminous point, like a star of the 6th or 7th magnitude. Captain Kater thinks that the distance of the volcano from the edge of the moon was about one tenth of her diameter; and the angle which it formed with a line joining the cusps on the last-mentioned evening, was about 50°. On the 7th it was scarcely visible, in consequence, probably, of the increased light of the moon.

A Further Account of Fossil Bones discovered in Caverns inclosed in the Lime-stone Rocks at Plymouth. By Joseph Whidbey, *Esq. In a Letter addressed to Sir* Everard Home, *Bart. V.P.R.S.* Read February 8, 1821. [*Phil. Trans.* 1821, *p.* 133.]

These bones were found not far from those previously described by Mr. Whidbey, and in a similar situation; the cavern being entirely inclosed in the surrounding rock, and without the smallest appearance of any communication ever having existed with the sur-